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INTRODUCTION AND OVERVIEW

1 Scope of the book

Macroeconomic theory has been a rapidly evolving subject over the past few years. For a long time it was approached in a rather descriptive and non-analytic fashion. While some progress was made in the 1950s at formal macroeconomic model building, the subject was never treated with anything like the rigour with which microeconomics was studied and frequently taught.

This is beginning to change. Much of the recent and current research on the subject has been, and is being, directed at trying to set it in a sounder theoretical framework. In particular, people have become aware of the need for any behavioural relationship embedded in a macroeconomic model to be derivable, at least in principle, from considerations relating to the individual decision-making units within the economy. In other words, the aggregate (macro) system, reflecting the actions of all the individuals (micro units) in the economy, should, in some broad sense, be consistent with their behaviour.

The first area of macroeconomics which economists attempted to derive from underlying microeconomic principles was the analysis of the consumption function. This was the subject of a good deal of theoretical research starting in the late 1940s with the pioneering work of Duesenberry (1948), Modigliani and Brumberg (1954), Friedman (1957), Ando and Modigliani (1963), and Yaari (1964). In this respect, progress in the theory of investment was somewhat slower. It would not be unfair to say that this subject was treated in a rather ad hoc manner until well into the 1960s, when the initial appearance of Jorgenson’s work (1963, 1965) revolutionized the approach, basing it on the neoclassical micro theory of the firm. Subsequent work by Jorgenson himself, with various co-authors, and more recently by Bischoff (1971), Lucas (1967), Gould (1968), Treadway (1969) and others has continued this development to the point that it has now become the firmly established approach to investment theory. Similar progress has been taking place in the treatment of financial markets in modern macroeconomic theory. For many years, the demand for money was studied in isolation, in
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terms of the three Keynesian motives, expressed in terms of the transactions, precautionary, and speculative demands. With the appearance of work by Patinkin (1965), Tobin (1969) and others, the more recent approach has been to consider the demand for money, along with the demands for all other financial assets, in the context of a general equilibrium portfolio framework. Finally, the area of employment theory and labour markets provides a further example in which progress is being made to base modern macroeconomic theory on microeconomic principles. However, this is a much more recent development and is a much less settled issue at this stage; see Phelps (1970).

Despite these developments, we do not mean to suggest that it will be possible to treat macroeconomics with the same theoretical rigour with which micro theory is typically studied. It almost certainly will not. Even if a completely general intertemporal, stochastic, theory of microeconomic behaviour were ultimately developed, there would always remain the inherently intractable aggregation problem, whereby the relationships at the aggregate level are obtained from the underlying individual relationships. The intractability of this problem has long been recognized by economists; see Theil (1954). It stems from the fact that it is only under extremely restrictive conditions that the behavioural relations at the aggregate level will be of the same form as functions of the aggregate variables, as they are at the individual level. But recent work by mathematical economists goes much further than this. It has been argued that the restrictions obtained from utility maximizing behaviour for the microeconomic relations provide almost no information as to the likely properties of the corresponding aggregate functions; see Debreu (1974), Sonnenschein (1972). If this view is taken seriously, it would suggest that the advantages in deriving macroeconomic relationships from microeconomic principles may be overstated.

But in spite of these enormous difficulties it would be fair to say that progress has been made in giving macroeconomic theory a firmer theoretical foundation. Particular attention is being devoted to recognizing the existence of budget constraints, which play such a crucial role in microeconomic theory, and to formulating macroeconomic models consistently within these constraints. To this extent at least, a more consistently formulated macroeconomic theory can be said to be emerging.

In this book we attempt to give a fairly rigorous analysis of macroeconomic theory. Our concern is with developing and analysing a consistent, integrated model, rather than with any detailed discussion of particular expenditure functions. Thus we do not devote any attention to discussing such issues as the consumption functions, the investment function, or the demand for money functions. These have all been discussed at length in many excellent textbooks elsewhere; see e.g. Branson (1972), Evans (1969), Lovell (1975), Wonnacott (1974). Rather, our approach is to take some general form of these functions as given (hopefully having reasonably firm microeconomic underpinnings) and to insert them into a complete macroeconomic
model. Our purpose is to analyse the behaviour of the model as a whole rather than with a detailed construction of its component parts. We should also emphasize that the book represents a theoretical exercise in macroeconomics. Almost no attention is devoted to discussing empirical issues, either pertaining to the empirical estimation of the model, or to the more general empirical literature which has evolved. Again some of this is discussed in other texts; see Evans (1969), Cramer (1971), Kuh and Schmalensee (1973), Bridge (1971). One exception to this is that we do make use of available empirical evidence on certain relevant parameters, insofar as these may be of assistance in determining the likely behaviour of the system, where otherwise no conclusion could be drawn.

Our approach is to develop a succession of models of increasing complexity, beginning with relatively simple extensions of the traditional textbook model (see e.g. Branson). In building these models, the main emphasis of our analysis is on what we shall refer to as the intrinsic dynamics of the system. By this we mean the dynamic behaviour stemming from certain logical relationships which constrain the system; specifically the relationships between stocks and flows. For example, the process of saving gives rise to the accumulation of assets and it is this change in the stock of assets which causes the system to evolve over time. It is only relatively recently that this fundamental dynamic economic process has begun to be incorporated into macroeconomic theory, although it was central to the more specialized subject of economic growth; see Burmeister and Dobell (1970). In any event, it provides a cornerstone to the model we shall develop.

With few exceptions (notably Chapters 13 and 14), we shall abstract from lags in the underlying behavioural relationships. In this respect, our approach provides a contrast to what one might regard as the traditional short-run dynamic macroeconomic model, in which the dynamics is often due entirely to the existence of such lags; see Allen (1959, 1967). By abstracting from them, we do not mean to deny their importance, for this is obviously an unquestionable empirical fact. Rather, our reason for neglecting them is that they are not fundamental to the logical consistency of the model in the same way as the intrinsic dynamics clearly are.

2 Outline of the book

The book is divided into three parts. Chapters 2–8 develop and analyse a progression of models for a closed economy; Chapters 9–12 extend these models to allow for international transactions; Chapters 13, 14 deal with problems of stabilization policy.

Our starting point is the traditional textbook static macroeconomic model and in Chapter 2 we begin with a review of the standard IS–LM model, together with the various traditional extensions incorporating the labour market. Chapter 3 deals with some of the issues which arise in the formulation of a consistent macroeconomic model. The main point of this chapter is to begin
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with the underlying constraints facing the various groups in the economy (households, firms, and the government) and to make sure that the behavioural relationships we shall consider are consistent with them. Since throughout this volume we shall use both discrete-time and continuous-time models as convenient, this question is considered for both types of formulations. On the whole, discrete-time analysis is probably more useful where one is concerned with analysing period-by-period effects of various policies, and in particular their short-run impacts. But discrete-time analysis has its drawbacks and continuous-time formulations are generally more useful in longer-run analyses, where the arbitrary choice of time unit may become more critical. In any event, the procedure whereby the continuous-time model is obtained as the limit of an underlying discrete model raises technical issues which require the derivation to be performed with some care. That is the reason why it is necessary to treat the two systems separately.

The first dynamic model is introduced in Chapter 4. This is accomplished by introducing the government budget constraint into the IS–LM fixed-price model of Chapter 2. This idea was introduced into macroeconomic theory at a relatively late stage by Ott and Ott (1965), Christ (1967, 1968). The essential idea is the observation that any government deficit needs to be financed. Assuming that tax rates remain constant, this can be achieved either by issuing more debt, or by issuing more money (or both). To the extent that the short-run equilibrium of the economy (the level of income and the rate of interest in the IS–LM context) depends upon the stocks of these assets held by the private sector, as these stocks change, this equilibrium will change and the system will evolve over time.

Chapter 5 introduces the wage-price sector, paying particular attention to the role of inflationary expectations. Along with the dynamics of asset accumulation, the evolution of inflationary expectations over time also plays an important role in the dynamics of the overall model. In the following chapter we present our first integrated model. This is obtained by incorporating the analysis of the wage-price sector of Chapter 5 into the conventional static model summarized in Chapter 2. Attention is focused on the short run, although account is taken of the government budget constraint discussed in Chapter 4. Being short run, this model can treat the expected rate of inflation as a given parameter and particular emphasis is placed on analysing the effects of changes in these exogenous anticipations on the short-run equilibrium of the system. The short-run effects of monetary and fiscal policy in an inflationary context are also discussed.

Chapter 7 extends Chapter 6 to what we call the ‘intermediate run’. In doing so it introduces several new features. First, we allow for the accumulation of government debt (money and bonds) just as we did for the fixed-price model of Chapter 4. Secondly, we relax the assumption made in our first dynamic model (Chapter 4), that the capital stock remains fixed, and instead allow it to vary as well. This extension of the Ott and Ott and Christ
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analysis was first undertaken by Blinder and Solow (1973). They noted, quite correctly, that the earlier literature had made a somewhat contradictory assumption, namely, that although net investment was assumed to be taking place, nevertheless the capital stock was treated as remaining constant. This was in direct contrast to the treatment of government debt, the adjustment of which formed the basis for the dynamics of the system. Moreover, in introducing the dynamics of capital accumulation in an inflationary context, it becomes necessary to distinguish between the physical capital itself and the financial claims on capital issued by firms, which we take to be equity. The final modification pertains to our treatment of expectations. Whereas in the short run these could be taken as given, over time they evolve and are determined endogenously.

The model is 'intermediate run' in the following two senses. First, it makes the traditional Keynesian assumption that although capital is accumulated over time, instantaneously it is fixed. Labour is the only short-run variable factor of production which is adjusted to meet the demand-determined output. It therefore does not allow for the substitution of capital for labour (or vice versa) in response to their relative price movements. The second sense in which it is intermediate run is that, unlike the Blinder–Solow model in which the equilibrium they consider is one with a zero rate of investment, the equilibrium for this model is one in which investment is occurring at a positively, endogenously determined rate. The reason for defining it in this way is discussed in Chapter 7 below.

Our final model of the closed economy is presented in Chapter 8. This is a long-run model in which the full capital deepening effects of investment are introduced. In addition, this chapter seeks to integrate some of the more advanced theoretical issues introduced previously in Chapter 3, but which hitherto were not fully treated. For example, in Chapter 3 we will be discussing the implications of stock and flow constraints in continuous time models and their implications for product market equilibrium. We will also be showing how the introduction of capital gains on financial assets, required for the consistent accounting of the system in real terms, also imposes dynamic behaviour on the system. These problems, which are of a somewhat more technical nature, are included in greater generality in this chapter.

Part II introduces international transactions into the model. But we hasten to emphasize at the outset that we do not intend to give a detailed treatment of international economics. Obviously space limitations preclude this and in any event, there are many excellent references available dealing with this subject; see e.g. Takayama (1972), Stern (1973), Mundell (1968), Caves and Jones (1973). Rather, this part should be viewed as an extension of part I to a small open economy, and in many respects our analysis parallels our discussion in earlier chapters quite closely.

Specifically, Chapter 9 reviews the basic static macroeconomic model of a small country. This is the analogue of the IS–LM type models discussed in
Chapter 2. Chapter 10 extends this model to allow for variable prices and in particular provides a framework for analysing the short-run effects of foreign inflation on the domestic economy and the appropriate monetary, fiscal, and exchange rate policies to deal with it. This is still a short-run model and can be viewed as an extension to Chapter 6.

Chapters 11 and 12 deal with the longer-run dynamic models of an open economy, incorporating the dynamics of international capital flows, together with that of asset accumulation. Chapter 11 looks at this question within the context of a fixed price – fixed exchange rate economy. It therefore represents the analogue to Chapter 4. Chapter 12 extends this analysis one stage further by introducing the rate of inflation and considers the longer-run effects of monetary and fiscal policies in the context of an inflationary economy. Moreover, it deals with both fixed and flexible exchange rate regimes. On the other hand it is less general than the corresponding chapters for the closed economy, Chapters 7, 8, in that purely for reasons of analytical tractability, we are forced to assume that physical capital remains fixed.

With few exceptions, the analysis of monetary and fiscal policies throughout Parts I and II deals with them in the sense of considering the effects, over various time horizons, of some fixed policy, which is maintained throughout. For example, one standard kind of exercise is to consider the short-run and long-run effects of a sustained increase in government expenditure, with the only adjustment in the stock of money or bonds being that required to finance the induced government deficits as they occur. This form of analysis is standard practice in modern macroeconomic theory and undoubtedly provides a lot of insight. However, in reality governments do not maintain fixed policies in this way. On the contrary, they are continually changing their monetary and fiscal instruments in order to try and achieve certain specified objectives. Part III therefore takes up the question of stabilization policy, though treating it at a fairly general level. Chapter 13 deals with some of the more traditional aspects of this topic, while some of the more recent developments in optimal stabilization theory are outlined and applied in the concluding chapter.

3 Methodology

We have already remarked that this book is primarily a theoretical exercise. The basic analytical method used is that of comparative statics. Essentially what this involves is to study the economic system at a given state and to see how it is affected by changes in various factors, which at that point of time can be taken as given. Depending upon what is taken as given determines whether we are dealing with a situation of short-run equilibrium or some kind of longer-run steady-state equilibrium. We also consider the evolution of the system over time and where possible discuss its stability properties. In general our strategy is to proceed from a consideration of short-run (sometimes instantaneous) equilibrium to the steady-state equilibrium, to which a stable system will converge.
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Much of contemporary macroeconomic theory proceeds in this fashion, so in this respect our approach is not very different. However, this mode of analysis does have its limitations. One serious difficulty is that we are restricted to looking only at some kind of equilibrium situation, which typically holds instantaneously (short run) or in the steady state (long run). The problem is — particularly with continuous-time models — that both these extremes may themselves be of limited economic interest. The instantaneous equilibrium is too short in that it allows insufficient time for relevant feedbacks to occur; the long-run steady-state equilibrium is too long, in that it takes an infinite time to be reached. It may be of limited interest, at least for practical policy purposes, to consider a stationary state in which investment and savings has ceased.

While it is essential to be aware of these limitations, comparative statics is still an extremely important and fundamental method of analysis. But it must be used properly, especially if one wishes to use any conclusions obtained in this way, as the basis for policy decisions. For example, one would not want to base policy recommendations too literally on the comparative static properties of some long-run steady-state equilibrium. But nevertheless this kind of analysis can provide a good deal of significant information. Perhaps the most appropriate way to view the role of comparative statics as the basis for policy discussions is the following. Knowing something about the initial effects of some policy (the instantaneous equilibrium) and the terminal effects (the steady-state equilibrium), should yield one a good deal of insight into the likely effects of the policy over some more relevant intermediate finite time horizon. In other words, these two extremes should be treated as reference points, which provide a foundation upon which more practical policy decisions can be based.

A second approach to making steady-state comparative statics more operational is to define the system in such a way that its steady-state equilibrium, which, although in theory reached only in infinite time, nevertheless may be approached quite closely in finite time. For this reason, the intermediate-run equilibrium we consider in Chapter 7, in which investment proceeds at a constant (endogenously determined) rate, rather than ceases, may be particularly relevant for policy purposes.

Finally, at a more practical level, an alternative method which is often proposed for analysing the dynamic properties of macroeconomic models such as those we shall be developing, is that of numerical simulation. While this approach is also important, it too has its limitations. The behaviour of a reasonably complex system typically depends rather critically upon the exact parameter values chosen, and only rarely are definitive answers provided to issues pertaining to the dynamics of the system. In assessing these results, it is important to have some idea of the theoretical properties of the model, to serve as background and to which such simulations can be related. In this respect, the two approaches are complements rather than substitutes.
PART I. THE CLOSED ECONOMY
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REVIEW OF BASIC MACROECONOMIC MODEL

1. Some preliminary concepts

Traditional macroeconomic theory is concerned with analysing certain aggregate economic variables. These include, among other things, such variables as the level of employment, the level of real income and its components, consumption and investment, the quantity of money, the rate of interest, the level of prices and more recently the rate of inflation. In most cases these aggregates are fictions. For example, there is no such thing as the rate of interest, or the level of prices, or the level of real output etc. Rather, there are many rates of interest, and millions of different commodities each having its own price. To formulate an economic model capable of studying each individual economic quantity is obviously an impossible task and considerable insight into the economic system can be obtained by analysing these aggregates. However, it should be clearly understood that macroeconomic analysis presupposes a considerable level of aggregation. Specifically, conventional theory tends to aggregate the economy up to four markets namely

(i) the output or product market,
(ii) the money market,
(iii) the bond market,
(iv) the labour market.

Because of Walras’ law, which we shall discuss more fully in Chapter 3 below, only three of these markets are independent. Hence one of them can be eliminated, since its equilibrium is assured by the equilibrium of the other three. Traditionally, it is the bond market which is eliminated, with the analysis focusing on the other three. But there is really no reason why this should be so, and a well defined macroeconomic theory could just as easily be developed in terms of, say, the money market, the bond market and the labour market.

In order to provide a framework for the rest of this book, this chapter is devoted to summarizing the basic macroeconomic model. Because detailed treatment of the underlying relationships can be found in numerous excellent texts, our discussion will necessarily be brief, focusing on those issues most
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relevant to subsequent discussion.¹ The model is constructed by first developing the demand side of the system, described by the output and money markets. To complete the model one must consider the determination of supply and this involves analysing the labour market.

The starting point for any macroeconomic model is the national income accounts. These can be looked at from different viewpoints enabling one to break down gross national product (GNP) in several different ways. One basic way of considering GNP is from the point of view of expenditure on final output. Assuming a closed economy, this is described by the relationship

\[
    GNP = C + I + G
\]

(2.1)

where
- \( C \) = consumption expenditure by the private sector,
- \( I \) = gross private domestic investment,
- \( G \) = total government purchases of goods and services.

That is, output must either be consumed by the private sector, invested by the private sector, or purchased by the government. Throughout the book we shall assume that investment goods do not depreciate, so that there is no need to distinguish between gross and net investment.

In an open economy, the national income accounts must also take account of transactions involving foreign residents, so that (2.1) must be modified to:

\[
    GNP = C_d + I_d + G_d + X
\]

(2.2)

where
- \( C_d \) = private consumption expenditure by domestic residents for domestically produced goods,
- \( I_d \) = private investment expenditure by domestic residents for domestically produced goods,
- \( G_d \) = domestic government expenditure on domestically produced goods,
- \( X \) = exports.

Using the relationships

\[
    C = C_d + C_m
\]

\[
    I = I_d + I_m
\]

\[
    G = G_d + G_m
\]

where the subscript ‘\( m \)’ denotes imports, (measured in terms of domestic currency) and observing that total imports, \( IM \) are defined by

\[
    IM = C_m + I_m + G_m
\]

the GNP for the open economy can be written in the alternative form

\[
    GNP = C + I + G + X - IM.
\]

(2.3)

Since in Part I, we shall be concerned with a closed economy, we shall not require (2.2), (2.3) for the meantime. We will, however, make extensive